

PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF AGRICULTURE
(LIVE STOCK BRANCH)

BULLETIN No. 77

SHEEP-RAISING IN BRITISH COLUMBIA

BY
S. H. HOPKINS



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DEPARTMENT OF AGRICULTURE,

VICTORIA, B.C., March 1st, 1918.

*To His Honour Sir FRANK STILLMAN BARNARD, K.C.M.G.,
Lieutenant-Governor of the Province of British Columbia.*

MAY IT PLEASE YOUR HONOUR:

I have the honour to submit herewith for your consideration Bulletin No. 77, "Sheep-raising in British Columbia," prepared by S. H. Hopkins, Assistant Live Stock Commissioner, under the direction of Wm. E. Scott, Deputy Minister of Agriculture.

JOHN OLIVER,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,

VICTORIA, B.C., March 1st, 1918.

Hon. John Oliver,

Minister of Agriculture, Victoria, B.C.

Sir,—I have the honour to submit herewith for your approval Bulletin No. 77, entitled "Sheep-raising in British Columbia," which has been prepared by S. H. Hopkins, Assistant Live Stock Commissioner, of the Live Stock Branch of the Agricultural Department.

I have the honour to be,

Sir,

Your obedient servant,

WM. E. SCOTT,

Deputy Minister of Agriculture.

PROVINCE OF BRITISH COLUMBIA.

DEPARTMENT OF AGRICULTURE—LIVE STOCK BRANCH

HON. JOHN OLIVER,
Minister of Agriculture.

WM. E. SCOTT,
Deputy Minister of Agriculture.

W. T. McDONALD, B.S.A., M.S.A.,
Live Stock Commissioner.

* H. RIVE, B.S.A.,
Chief Dairy Instructor.

J. R. TERRY,
Chief Poultry Instructor.

* WM. NEWTON, B.S.A.,
Soil and Crop Instructor.

E. HOGAN, B.S.A.,
Soil and Crop Instructor.

** H. E. WALKER, B.S.A.,
District Agriculturist, Prince George.

A. KNIGHT, V.S.,
Chief Veterinary Inspector.

W. W. ALTON, V.S.,
Veterinary Inspector.

** S. H. HOPKINS, B.S.A.,
Assistant Live Stock Commissioner.

T. A. F. WIANCKO,
Dairy Instructor.

H. E. UPTON,
Poultry Instructor.

H. O. ENGLISH, B.A., B.S.A.,
Soil and Crop Instructor.

GEO. C. HAY, B.S.A.,
District Agriculturist, Telkwa.

* S. F. DUNLOP,
Assistant Agriculturist.

S. A. K. WHITE, V.S.,
Veterinary Inspector.

B. R. ILSLEY, V.S.,
Veterinary Inspector.

WM. J. BONAVIA,
Secretary to the Department.

* Granted leave of absence for overseas service.

** Since resigned.

SHEEP-RAISING IN BRITISH COLUMBIA.



THE big-horn or mountain sheep is one of our Provincial emblems, appearing on the coat of arms of British Columbia. Domestic sheep-raising, however, has not yet been given the attention it deserves. The census of 1917 shows only about 50,000 sheep in this Province of over 300,000 square miles. While the raising of cattle, horses, and hogs has steadily increased, the sheep industry has lagged behind until recently, notwithstanding the fact that most of our agricultural land is eminently suitable, and a good proportion of it more suitable for sheep-raising than for any other line of industry.

British Columbia is far from being self-sufficient in the matter of sheep, although the imports of sheep and mutton are being reduced, as can be seen from the following figures:—

IMPORTS OF SHEEP AND MUTTON INTO BRITISH COLUMBIA.

	1916.		1915.		1914.	
	No.	Value.	No.	Value.	No.	Value.
Sheep imported from foreign points	25,506	\$100,801	24,455	\$ 97,105	56,373	\$ 210,874
Sheep imported from other Provinces	13,254	122,886	31,333	217,498	17,511	108,208
Mutton imported from foreign points	1,927,324	210,307	2,770,221	323,955	3,693,782	378,002
Mutton imported from other Provinces	338,335	65,051	1,221,425	176,290	1,970,041	303,949
Totals	...	\$608,045	...	\$814,848	...	\$1,001,033

SHEEP POPULATION OF VARIOUS COUNTRIES.

British Columbia	50,000
Canada	2,088,000
United States of America	50,000,000
Australia	82,000,000
New Zealand	25,000,000
United Kingdom	28,000,000

The foundation of the sheep industry in British Columbia was the first flock brought in from California by the Hudson's Bay Company in the early part of the nineteenth century. These sheep were first kept at Fort Nisqually, near what is now the City of Tacoma, Washington. On the establishment of a Hudson's Bay post at Victoria in 1843, sheep were brought from Fort Nisqually to stock the company's farm. In the year 1846, when the International Boundary-line settlement placed Fort Nisqually in the United States, the flocks there were dispersed to form the foundation for the present large sheep industry in Oregon and Washington. In 1840 the flocks numbered several hundred head on what is now the site of Victoria. Well-bred rams were imported from Great Britain round Cape Horn. These sheep had to be guarded by armed Indian shepherds and corralled at night. Some asses, of course, occurred from the ravages of panthers, wolves, bears, and dogs, and on one occasion a band of Indians from up the Coast raided the settlement, killed a

shepherd, and carried off some sheep. Soon afterwards a British gunboat visited the Indian village and the murderers were hanged. Those pioneer stockmasters would smile at our present-day hindrances to sheep-raising.

The first importation of pure-bred sheep by private individuals were of the Leicester breed in the early seventies, followed by Southdowns and Shropshires from Ontario. The industry spread to the islands in the Gulf of Georgia, and when the Island of San Juan was finally ceded to the United States a good deal of smuggling was carried on. The practice was to secretly land American lambs on the Canadian islands, whence they were shipped to Victoria as the produce of Canadian ewes. The small number of ewes on the Canadian islands thus obtained a surprising reputation for prolificacy.

In the sixties and seventies sheep-ranching was a flourishing industry in the Interior of the Province, notably in Cariboo and Nicola. Large bands of as many as 10,000 were ranged by experienced herders from Australia and California. No winter feeding was done in those days, except that in some cases the rams were winter-fed. Instead of providing hay the lower benches were kept ungrazed for winter feeding where there was least snow. In the growing season the bands were driven to higher elevations as the vegetation started to grow. In this way the winter, summer, and fall ranges were always widely separated and long distances were covered in a year's grazing. In those days sheepmen could pick and choose their ranges according to the season. Now, owing to closer settlement, they cannot.

The Cariboo goldfields provided a fine market while it lasted, but when that dwindled the sheep had to be marketed at the Coast. The cost of transport to Victoria and the low prices (\$3 to \$4 each, and 5 to 10 cents a pound for wool) obtained in competition with American sheep discouraged the Interior sheep-raisers. Added to this was the marked hostility of the cattlemen, who claimed that the sheep ruined the grazing, and who were not above resorting to personal violence. Owing to these conditions the industry languished. In the Coast districts the keeping of small flocks was never very extensive, and these dwindled with the advent of low prices after the gold-rush.

The days of the large-range flocks of many thousand head are gone by owing to the range being mostly taken up and the impossibility of obtaining adequate winter, summer, and fall range in one tract. Several fairly large flocks up to as many as 2,000 head are still run in the Interior, and extensive grazing tracts still unoccupied give room for more. It may be said, however, that owing to closer settlement the range-sheep industry is not capable of as great expansion as some people suppose.

It is to the establishment and increasing of the smaller flocks that we must look for the largest increase in numbers of sheep in the Province. On the rich lowlands of the Lower Fraser Valley now devoted to dairying there are many fine pure-bred and grade flocks, but there is no good reason why sheep should not be kept on our Coast dairy-farms far more extensively than at present. Sheep are just as necessary and profitable on high-priced land as on our rough, cheap lands.

In the Interior of the Province (apart from the menace of coyotes, which do much damage) the climate and general conditions are nearly everywhere ideal for sheep. On the ranches and smaller mixed farms of the Interior, and even in the fruit-growing sections, sheep are proving very profitable in small flocks, well managed. Mutton and wool are bound to be high for years, due to the crowding-out of American range flocks. A small flock of sheep is a good investment at this time.

DISTRICTS FOR SHEEP-RAISING.

To the new or intending settler who asks what is the best district for engaging extensively in sheep-raising, we would say that, while sheep thrive in all our districts under proper management, some parts offer larger openings than others. Flocks are particularly healthy throughout the Province, no extensive disease being present although it is true that gaitre seems to affect some districts to some extent,

and a species of tick which causes paralysis has caused trouble in the Similkameen District. The Districts of Cariboo and Chilcotin are vast areas in which the cattle interests hold sway, but in the more outlying parts openings exist for grazing sheep. It is not lawful to run sheep and cattle on the same commonage. A large common exists in the Cariboo and a small one in the Nicola District. The difficulty here, as in most Interior districts, will not be to find summer range, but to obtain land on which to grow the winter feed which must be provided to ensure success. This, in many of the Interior sections, will have to be grown under irrigation. The lower part of the North Thompson Valley and the district around Kamloops likewise affords fine openings under similar conditions. The Southern Okanagan District in the Dry Belt has areas most suitable for grazing sheep, and the snowfall is light, but it will be necessary to winter-feed to some extent. The fruit-growing industry has, of course, taken most of the irrigable hay land available in this district. The Nicola District is already well stocked with cattle, but in the Ashcroft District some large flocks are run. There are openings also in the East Kootenay District, which is at an elevation of about 3,000 feet above sea-level, with severe winters, making the growing of winter feed under irrigation a necessity. The disadvantage of the northern districts along the Grand Trunk Railway is the lack of open range. The Coast districts where not settled are almost all heavily timbered. Most of the pure-bred flocks are at present on the smaller (dairy) farms in the Coast districts, mainly in the Lower Fraser Valley and on Vancouver Island and the Gulf Islands. Cougars sometimes cause losses, especially on Vancouver Island, but on the smaller Gulf Islands there are no wild-animal pests to destroy sheep except eagles, which occasionally take a lamb.

ADVANTAGES AND PROFITS IN SHEEP-RAISING.

Although sheep are not as prolific as hogs, they bring returns almost as quickly, and do not require as much labour or expensive grain feed. The returns from wool alone may be generally reckoned as sufficient to pay for the ewe's keep for the year. The lamb-crop should average one to every ewe, so that after deducting interest and cost of labour the returns from lambs and mutton are almost clear profit. Roughly speaking, the gross returns every year should equal the capital invested in the breeding flock, with good management. Sheep will eat 90 per cent. of the weeds commonly found on our farms, converting them into wool, mutton, and valuable fertilizer. Sheep can be made to save a great deal of labour by having them harvest the crops themselves, at the same time enriching the land. Grain left in the stubble and volunteer growth after harvest is not wasted if sheep are kept. On a dairy-farm sheep do well put on pastures after they have been eaten down by cows.

FACTORS GOVERNING CHOICE OF A BREED.

Our domestic breed of sheep are all descended originally from wild mountain-sheep—probably from an Asiatic wild variety. The successful management of sheep is really based on the above fact. Sheep are by nature the inhabitants of only mountainous areas. Their natural home is in the high altitudes, which provide free range, a wide variety of food, and soil conditions which ensure perfect drainage and freedom from the numerous forms of parasites which abound in damper lowland soils. Even with those breeds that have been developed in domestication for lowland conditions, we have to guard all the time against the effects of a more or less unnatural environment.

WHAT IS THE BEST BREED?

This depends mainly on the altitude and climate of the locality, kind of feed available, and the nature of the enterprise. Where there are many sheep already in the district it will probably pay you to choose the popular breed. There are usually good reasons for it being popular.

The larger long-wool breeds have been developed on rich bottom lands that produce abundant feed. They are therefore suited to similar conditions on moist, fertile lowlands. The smaller breeds, such as the Southdown and Cheviot, have always been accustomed in their native British home to the scantier feed of the hills or downs. There seems to be some connection between the higher quality of wool and mutton in the smaller breeds and the scanty but nutritious vegetation on which they have been developed. It is well known that the mountain breeds are smaller, hardier, and more active than the lowland breeds. We cannot expect to breed good sheep of the larger long-wool breeds on elevated and broken, scant pastures. The effect of climate has to be considered. For instance, in the Interior the smaller, close-woolled Down breeds will stand the winter's cold and snow on their backs better than the larger, open-fleeced sheep. On the other hand, it is related that the fine-woolled Merinos were a failure in the wet climate of the Willamette Valley, Oregon. The long-continued drizzle made the hay and weed seeds on their backs sprout and become green, whereas the fleece of the long-woolled breeds acted as a thatch, carrying the water off. This valley is now famous for its Lincolns. The larger long-woolled breeds, including the Lincoln, Cotswold, Leicester, and Romney Marsh, are suited to Coast conditions.

If a large band of sheep are to be under range conditions a certain amount of Merino blood is desirable, as these sheep are the easiest to herd.

If winter or "hothouse" lambs are to be produced, to be born in the fall or early winter, it will be necessary to choose a breed which can be counted on to lamb early. The Dorset, Merino, and Tunis breeds are most used for this purpose.

COMMUNITY BREEDING.

There are advantages in choosing a breed favoured by the majority. You can buy stock near home from a flock you know is successful. You will also find a good market for any stock you wish to sell. It is a great attraction for buyers when a district becomes famous for one particular breed. There is more competition in the show-ring and field if others keep the same breed. Hence there is more stimulus to raise the standard of your flock. Good rams are procured more easily and cheaply. The above are some of the advantages of what is termed "community breeding."

The flockmaster's personal preference for a certain breed counts, however. He is more likely to make a success of the breed in which he is most interested.

In England the various breeds are segregated into the different districts in which the breeds have been developed and for which they have proved especially adapted. No better examples of real community breeding could be found, and the degree of perfection and uniformity of most of these Old Country flocks is surely the direct result of community breeding.

BREEDS OF SHEEP.

All domestic sheep on this continent originated from importations from European countries. It is to Great Britain that we owe most of our present breeds, all having their origin in that small country, with the exception of the Merino, Rambouillet, Tunis, and Karakule. The above-mentioned breeds, with the exception of the Tunis, are horned, as also are the Dorset Horn and Black-faced Highland breeds. All the other breeds dealt with are hornless in both sexes, although they came originally from horned stock.

WEIGHTS OF SHEEP AND FLEECES.

Medium-quality Short-wool Breeds.	Mature Ram.	Mature Ewe.	Fleeces, Rams.	Fleeces, Ewes.
	Lb.	Lb.	Lb.	Lb.
Southdown	170-180	125-130	10-12	6-8
Shropshire	175-250	140-180	10-14	8-11
Oxford	250-350	180-275	12-16	12
Hampshire	225-275	175-200	8-12	6-8
Dorset Horn	200-225	150-175	8-10	6-8
Suffolk Down	200-240	150-200	8-10	7-9
Cheviot	175-200	140-160	7-11	6-9
Tunis	150	120	8-10	7-9
Ryeland	200-225	160-175	12-14	10-12
<i>Fine-wool Breeds.</i>				
Merino	150-175	100-125	{ A, 30 B, 25 C, 18	{ A, 20 B, 15 C, 11
Rambouillet	175-225	130-160	15-20	10-12
<i>Coarse-quality Long-wool Breeds.</i>				
Leicester	225-275	175-225	12-14	10-12
Cotswold	300-350	200-250	12-15	11-12
Lincoln	250-375	225-275	15-18	12-15
Romney Marsh	200-225	175-200	15-18	12-16
Wensleydale	200-250	175-225	12-14	10-12
Black-faced Highland	150	125	...	...

CLASSIFICATION BASED ON ALTITUDE.

Lowland Breeds—Cotswold, Leicester, Lincoln, and Romney Marsh.

Upland Breeds—Merino, Rambouillet, Southdown, Suffolk, Hampshire, Shropshire, Oxford Down, Ryeland, Tunis, Dorset, and Wensleydale.

Mountain Breeds—Black-faced Highland and Cheviot.

THE SOUTHDOWN.

This being probably the oldest breed of sheep in existence, it seems fitting that it should be dealt with first. The breed originated in a low range of hills in South-eastern England, known as the South Downs. The ancestors of the Southdown sheep of to-day were small, ill-shaped, horned sheep with light fleeces, but with an extra well-developed leg of mutton. Constant selection and breeding from only the best rams has made this breed what it is to-day—namely, the mutton sheep par excellence. The Southdown, moreover, has been widely used in the development of nearly all the other medium-wool breeds.

The Southdown is the smallest of the mutton breeds, but remarkably compact. In type and quality they are the mutton ideal. They are called "the big little sheep" on account of their deceptive weights. This breed has captured the majority of the prizes in the annual carcass competitions at Chicago.

The breed is noted for its early-maturing and easy-keeping qualities. These small sheep will thrive on pasture that would be insufficient for larger breeds. They are a short-pasture sheep. Hence if given very liberal feeding there is danger of them getting too fat to breed. The ewes are fairly prolific, but not equal to the best. The faults of the breed are that they are small and the fleeces light. However, the wool is of extra-good quality for a medium-wool breed.

The colour of the face may be brown or grey or mouse colour. The forehead and cheeks should be well woolled.



Southdown ram.



Southdown ewe.

THE SHROPSHIRE.

This breed has proved exceedingly popular in Canada. It originated in the County of Shropshire, England, by using the old Morfe Common breed as foundation stock and improving with Southdown, Cotswold, and Leicester blood. To show the improvement which has taken place it is sufficient to say that the Morfe Common



Shropshire Down ram.



Shropshire Down ewe.

were small, horned sheep with black, brown, or spotted faces. Their carcasses only weighed from 35 to 65 lb. when mature, and the average weight of fleece was about 2 lb. The modern Shropshire breed has spread to all the sheep countries of the world. It is known as the "farmer's sheep" from the profitable combination of wool and mutton in this breed. Rams of this breed have also been very widely used in the large-range flocks on this continent. The breed is very adaptable and soon becomes acclimatized. As good individuals can be produced here as in the breed's native home.

The Shropshire is an early-maturing and prolific breed. In size it is medium. The wool is of good quality and weight, the yield being above the average of the medium-woolled breeds. In the past the breed has been faulted for being light in the hind-quarters and for black fibre and dark spots on the skin occasionally cropping out. These faults are now being eliminated. The head and face of the pure-bred Shropshire should be well covered with wool, the eyes being almost hidden in the fleece.

THE OXFORD DOWN.

This splendid breed was developed by crossing Cotswold rams on Hampshire ewes. Some Southdown blood is also said to have been used. The place of their origin was Oxford County, England. At first there was a great lack of uniformity in the breed, as was natural in cross-breeds. Very soon, however, the breed took on a distinct type. The modern Oxford is known wherever sheep are extensively used. The Oxford and Hampshire are the largest of the medium-woolled breeds. The Oxford fleece is long and heavy, due to Cotswold foundation. Oxford rams are popular on the range, producing large lambs from the small-range ewes. The Oxford, being large, is not a short-pasture breed, and must have abundant pasture to thrive well. In early-maturing qualities and prolificacy it is about the average. Too open fleeces, dark spots on the skin, and occasional black fibre must be watched for and eliminated from Oxford flocks. The head should be well covered with wool over the poll, cheeks, and down to the eyes. Colour of face is an even dark grey or brown, either with or without a grey spot on tip of nose.

THE HAMPSHIRE DOWN.

The native home of this breed is in the county of the same name in Southern England. In the time of the Roman occupation the woolen-mills established at Winchester were supplied with wool from a large breed of horned sheep, the ancestors of the modern Hampshire, which owes its improvement to the effect of crossing the improved Southdown on the old Berkshire Knots and Wiltshire sheep. The Southdown cross reduced the size, but this was offset by breeding from the largest individuals. The modern Hampshire is next in size to the Oxford among the medium-woolled breeds. There is very little difference in the size and weights of these two breeds. Only two other breeds are larger—namely, the Cotswold and Lincoln in the long-woolled class. The Hampshire, like the Oxford, requires good care and plenty of feed to thrive well. The same may be said of all the larger breeds. Hampshires kept on scant and rocky pasture will alter in type and become "weedy," smaller, and "leggier." Hampshire rams are quite widely used for crossing on the range flocks of America. The lambs are large, rapid growers, and early-maturing. The rams are sometimes used for siring "hothouse" lambs. The breed is noted for its early-maturing qualities under favourable conditions. It is also quite prolific.

The fleece is on the light side, and this breed does not shear as well as the Oxford.

The Hampshire head is quite characteristic. The ears are large, long, and somewhat pointed, and stand out almost at right angles with the head. The face is black, and they have a Roman nose. The cheeks and forehead should be well covered with wool.

THE SUFFOLK DOWN.

This breed is not very old. It originated in Norfolk and Suffolk Counties by crossing Southdown rams on ewes of the old Norfolk breed, which were horned. One good point about the old breed which has been transmitted was that they were very prolific. The Southdown cross improved the mutton qualities and removed the horns. The Suffolk mutton is famed for its excellent quality and high dressing percentage, ranking with that of the Southdown. In South America Suffolk rams are very popular for crossing on Merino ewes for mutton purposes. In fecundity



Oxford Down ram.



Oxford Down ewe.

this breed ranks near the top. They are an early-maturing breed. The fleece, however, is apt to be rather light. The Suffolk is a fairly large, active, upstanding sheep. They are characterized by their jet-black head and legs, being darker than



Hampshire Down ram.



Hampshire Down ewe.

any of the other breeds in these points. The ears are pointed and are frequently carried pointing upward and backward from the head. They have no wool on the face or on the legs from the knees and hocks downward. This latter point helps to give them their upstanding, rather lanky appearance. In spite of this they dress

out to good advantage, not being so apt to become loaded with tallow as are some of the other breeds. Suffolks are fairly good rustlers, being an active breed.



Suffolk Down ram.



Suffolk Down ewe.

THE DORSET HORN.

This is one of the oldest of the improved breeds, and has been developed largely by selection without crossing. For centuries a similar type of horned sheep existed in Dorsetshire and the neighbouring counties in the south of England. This breed is medium-sized, white-faced, and both sexes are horned. The fleeces are rather

light, but the fibre is very white, and black is seldom seen. The Dorset has the reputation of being the most fertile of all the mutton breeds, ewes frequently producing triplets. American breeders report from 140 to 175 per cent. lamb-crop. The



Dorset Horn rams.



Dorset Horn ewe.

ewes will breed either in the spring or fall, as desired. It is claimed two crops of lambs a year can be obtained, but this not wise. The ewes are good mothers and excellent milkers, being formerly used in their native home for dairy purposes. On account of these qualities Dorset ewes have been largely used for the production of winter or "hothouse" lambs, which have to be born in the fall or very early in the year. The lambs grow very rapidly and show a finish which unfortunately is not carried if they are kept as wethers. The light shearing qualities and the fact that the Dorset is a hard feeder are the main objections to the breed.

THE CHEVIOT.

The home of this attractive little sheep . . . on the borders of England and Scotland. The ancestors of the Cheviot are supposed to have swum ashore from



Cheviot ram.



Cheviot ewe.

the wrecked ships of the Spanish Armada. During the Middle Ages the monks kept flocks of this breed in the vicinity of the monasteries. Later, Lincoln and Leicester blood was used to improve it. At the beginning of the last century the Cheviot breed was displacing the Black-faced Highland in Scotland to quite an extent, but in a series of bad winters it did not prove hardy enough on the high lands of the region, and the Black-faced breed came back to its own. Nowadays the two breeds

are crossed a great deal, and the resulting lambs make fine feeders. The Cheviot is a small, active, and hardy breed. On their native hills they subsist by grazing the year round, even with snow on the ground. In appearance they are clean-cut and stylish. The head, ears, and legs are free from wool and covered by short, white hair. There is a distinct ruff or collar about the neck. The wool is exceptionally white, but the fleeces are rather light. The ewes are good mothers and very prolific, having a large percentage of twins. There are no Cheviots at present in this Province, but the breed has been introduced with very satisfactory results in the more barren and elevated sections of Quebec.

THE TUNIS.

This breed comes from Northern Africa. The first pair were brought over in 1769, and the breed attained great popularity in the vicinity of Philadelphia for the quality of their mutton. This breed has proved very hardy and adaptable, being able to stand alike the extreme warmth of the Southern States and the cold of the northern winters. The ewes are very fertile, and will mate at almost any season. For this reason the Tunis has been used for the production of early "hothouse" lambs. At the Arizona Experiment Station Tunis rams proved superior to those of several other mutton breeds, such as the Oxford, Shropshire, Dorset, and Hampshire, for crossing on range ewes. The Tunis sheep proved very prolific, had excellent range qualities, and withstood extreme heat and the attacks of the bot-fly better than any other breed. The rams were especially good in these points. The breed is small and early-maturing. Both sexes are hornless. The head is covered with short hair, tawny-brown or brown and white in colour. The ears are large, broad, and pendulous. In mutton form this breed could be bettered. The leg of mutton is apt to be light. The tail is broad and fat, being originally used as a storehouse to carry the animal over famine periods. The fleece of the Tunis is classed along with the medium-woolled breeds.

THE RYELAND.

This breed comes from Herefordshire, England, from a district formerly noted for rye-growing. It is sometimes called the White-faced Shropshire. The old Ryelands were a small, white-faced breed, hardy, and with fleeces of excellent quality. This breed was improved by crossing with the Leicester. These sheep became very numerous, and for a long time the breed was an important one. Later the other down breeds crowded it out and it became almost extinct. Lately, however, the breed is on the ascendancy. The ewes have fine breeding qualities, being excellent mothers, good milkers, and very fertile, producing many twins and triplets. The Southdown crossed with this breed results in a very fine type of sheep. They are a hardy breed, with great spring of rib. They are easily fattened and thrive on scanty pasture. The carcass, however, is apt to contain too much tallow. The fleece is quite heavy and of excellent quality.

THE LEICESTER.

The English Leicester was almost the first of the modern improved breeds of live stock, and this breed, in turn, was used to improve many of the other British breeds of sheep. Not only this, but the development of this breed showed the way in the general improvement of all our live stock which has taken place during the last two centuries. Robert Bakewell, of Dishley Hall, Leicestershire, England, began this great movement in the agricultural world in 1755, working with the Old Leicester sheep and improving them by careful selection and breeding-out of all recognition. He produced sheep which would invariably hand down their characteristics to their offspring. That is to say, he fixed the type. His rams were widely used all over England, and they proved remarkably potent. The mutton, however, was not of the best quality, being coarse-grained and containing too much fat deposited on the outside of the lean instead of being mixed with it. Quality has been more in demand since then, and the Old English Leicester breed is not common.



Tunis ram.



Tunis ewe.

The Border Leicester, although an offshoot of the English Leicester, is a distinct breed, and the one we know best to-day. It was developed among the Cheviot Hills from some of Bakewell's stock. The mutton qualities were improved and the head made clean-cut and free from wool.

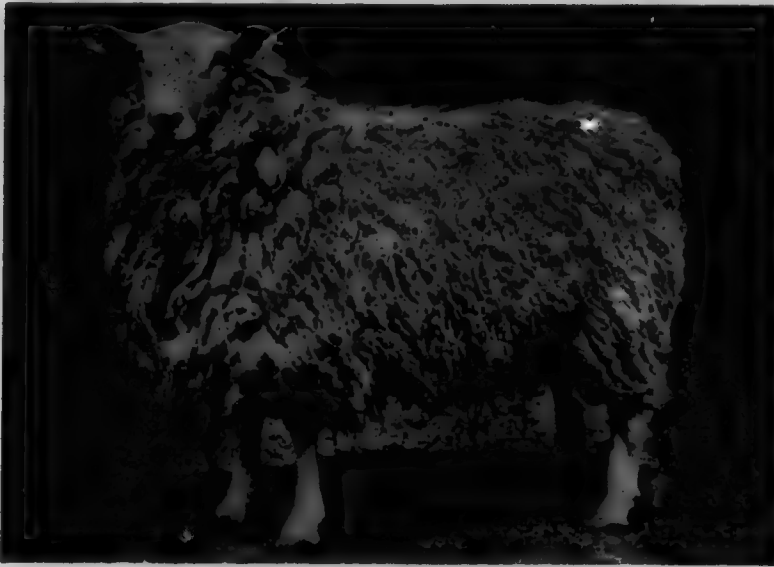


Ryeland ram.



Ryeland ewe.

The Leicester is the smallest of the long-woolled breeds. The body is very neat. The spring of rib is pronounced, making the body wide, but not deep. The mutton is not famous for its quality, and objectionable tallow is apt to be present. The fleece is of good length, hanging in beautiful ringlets of lustrous wool. In fecundity and early maturity they are just fair. The Leicester is fairly hardy for a large breed, but all the long-wools require plenty of feed.



Leicester ram.



Leicester ewe.

THE COTSWOLD.

This is another of the breeds which owe their early improvement to Leicester blood. The original Cotswolds existed in several counties of the West Midlands of England, and were large coarse-wool sheep of great vigour and constitution. The modern Cotswold has found favour in America, notably in Wisconsin and Oregon. In the moist climate of the Willamette Valley, Oregon, Cotswolds are produced that



Cotswold ram.



Cotswold ewe.

equal the best the Old Country can produce. It is largely the demand for Cotswold rams on the range to cross with Merino ewes which has caused the breed's popularity. The Cotswold is next in size to the Lincoln. These sheep have white or grey faces, and carry their heads very erect. The long fore-top on the forehead is characteristic. The mutton is of fair quality, although the admixture of fat and lean is not as desirable as in the smaller Down breeds. The feeding qualities are

good. They are not hard feeders, but must have good care and feed or they become unsightly. The fleece is rather open, and the wool hangs in ringlets of good length and quality. They shear a fairly heavy fleece. They are about medium in fecundity and early maturing qualities.

THE LINCOLN.

This breed is quite an old one, coming from the county of the same name in Eastern England. It originated by crossing Leicester rams on the Old Lincoln ewes. This is the largest of our domesticated breeds of sheep. It has become a favourite breed for crossing on Merino range ewes to produce large mutton lambs, and in Australia this cross has given rise to another new breed, the Corriedale. This large breed does not thrive on scanty pasture. The Lincoln requires plenty of feed and is adapted to lowland conditions. In Oregon the moist climate has been found well suited to them, and the Lincolns produced there are famous, being equal to the best English Lincolns. The mutton is inclined to be coarse. None of the long-wools produce mutton as palatable as that of the Down breeds. The fleece is the heaviest of all the mutton breeds, although not as heavy as that of the fine-woolled breeds. The wool staple is long and lustrous. In early maturity and prolificacy the Lincoln is not equal to the Down breeds.

THE KENT, OR ROMNEY MARSH.

This breed originated in a low-lying tract of land in Kent County, England, the marsh being a tract reclaimed from the sea. The old Romney breed lacked good mutton form and quality, but were hardy and produced a heavy fleece of long wool. They usually grazed throughout the year, and these sheep still subsist without winter feeding to-day in their native shire. The breed seems to have given good results where tried on this side of the Atlantic, although few have been bred so far. The breed is quite popular in New Zealand and Argentina.

It is claimed that Romney lambs are larger at birth than any other breed. The breed is white-faced and hornless and very hardy. The mutton is the best quality of any of the long-wool breeds and nearly as good as Down mutton. The fleece is long and dense and has some of the points of Down wool, ringlets not being so much in evidence as in the other long-wool breeds. The fore-top is not always present. The fleeces weigh exceptionally well, the wool being dense as well as long. The breed is not very prolific, not many twins being born.

THE WENSLEYDALE.

This attractive breed is descended from the old Teeswater breed. They are native to the north of England, and in appearance are similar to the Leicester, the two breeds having been mixed in the early days. The Wensleydale is a large, upstanding, hornless, long-wool breed, very active and hardy. One characteristic is that the face and legs and the whole skin to some extent are blue. The Old Country breeders prefer this colour, as it brings dark-faced lambs when the rams are crossed on Black-faced Highland ewes. This cross is very popular in the North of England for the production of hardy feeding sheep.

The mutton of the Wensleydale is of good quality. The fleece is long, but rather open, and falls in beautiful, close ringlets all over the body. The ewes are quite fertile and good milkers. The inside of the ears should be blue and the forehead adorned with a fore-top of curly ringlets.

THE BLACK-FACED HIGHLAND.

This romantic breed is a native of the Highlands of Scotland, but no one knows much about their origin. This breed and the Cheviot are the two important breeds of sheep in Scotland.

The breed is well adapted to mountainous areas with scanty pasture. They are exceedingly hardy and can withstand severe conditions where other sheep would die.



Lincoln ram.



Lincoln ewe.

They are out of place on ordinary farms, but, being very picturesque, are sometimes kept in parks. Highland sheep are small and very active, but not so restless as the Welsh mountain-sheep. Although the form of body is not the best, the mutton is of



Romney Marsh ram.



Romney Marsh ewe.

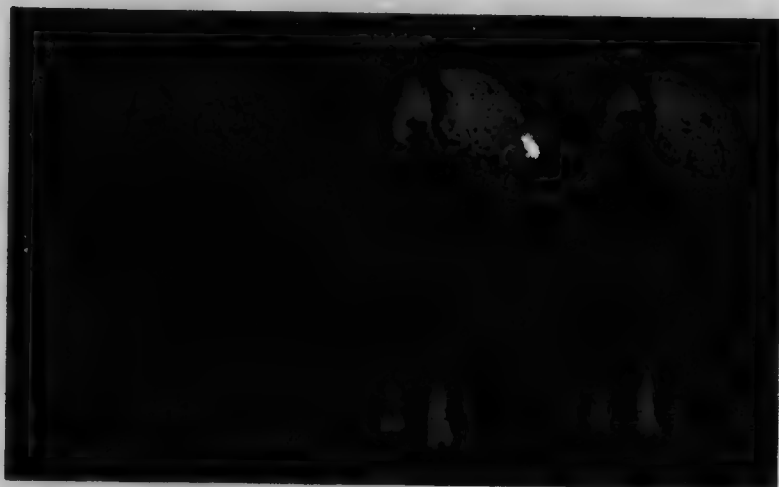
the highest quality. The fleece is long and coarse and contains much hair and kemp. It is classed as carpet-wool. Both sexes are horned. The face is often mottled with distinct white marks. The lambs are strong and hardy at birth.

THE KARAKULE, OR ARABIC.

This breed is the one used in the production of Persian lambskin or astrachan, the demand for which is increasing. Hence the interest aroused in America and Canada lately in the breed. One New York house imports as many as 250,000 skins



Wensleydale ram.



Wensleydale ewes.

annually. The demand is so great that it has led to a great deal of cross-breeding to increase the supply in their native country of Turkestan. For this reason there are comparatively few really pure-bred Karakules in existence. It is against the law in their native country to export these sheep, as the Bokharan noblemen wish to retain a monopoly of the trade.

The Karakule, like the Tunis, is one of the fat-tail breeds. The head is characteristic. The face is narrow and the forehead is much rounded. The rams generally have spiral horns, but the ewes are usually hornless. The ears are pendulous. The face and legs are covered by shiny, black hair. The fleece of the adults is coarse, long, and may vary from grey to black. The lambs when born are usually jet-black, and this lamb-wool has a high lustre and is closely curled in the best specimens. These curls open out after the lamb is ten days old, so that it must be killed before that time. Formerly the ewe was killed to obtain the skin of the unborn lamb, but this is no longer done. After the lambs are killed the ewes are



Black-faced Highland ram.



Black-faced Highland ewe.

milked, and the famous Brinza cheese is made. The value of a good skir is about \$15. This breed is extremely hardy and will thrive under very adverse conditions. In Bokhara the sheep are summer-grazed in the mountains, and winter in the lowlands. The mutton is said to be the most palatable of any breed. The fat, especially of the tail, is used by the natives as butter. Crosses of this breed with the Lincoln and with the Barbadoes or "Woolless" sheep (a very prolific breed) have proven fairly satisfactory.

THE MERINO.

Fine-wool sheep have existed in Spain as long as history tells, and important textile arts were founded early in that country on the fine-wool supply furnished by the ancestors of the Merino breed. These sheep were introduced into many countries,



Karakule ram.



Karakule ewe with lamb.

and the type improved notably in France, Australia, and America. The world-wide distribution of the Merino is accounted for by its own peculiar qualities. It is a most adaptable breed and exceedingly hardy, although its appearance does not indicate hardiness. It produces a heavy fleece of the best quality, and it has the inherited habit of banding closely together in large flocks when grazing. The United States has developed its own types of this breed. The Vermont Merino was devel-



Merino ram, Class A.



Merino ewe, Class B.

oped mainly in New England. It became the heaviest wool-producing sheep in the world, and the wool is of exceptional strength and fineness. The skin is in heavy folds over the body, giving a larger surface for the growth of wool. Only the ears and the nose are woolless, wool extending down the legs to the hoofs. The form of body is not at all good, however, from the mutton standpoint.

The Delaine Merino was developed in Ohio and Pennsylvania principally. This type is without or nearly without folds in the skin. Delaine Merinos have more

size and fatten easier than the Vermont Merino. The wool is longer and not as fine, the aim being to combine mutton qualities with fine-wool production. American Merinos are now divided into three classes—A, B, and C, according to the folds in the skin, fineness of wool, and mutton quality. This leads, of course, to some confusion. The Vermont Merinos usually come into Class A, which produces wool of the highest quality. Delaine Merinos are usually in Class C. These different types are crossed to obtain a type to suit the breeder.

The Merino was the foundation of the range-sheep industry on this continent in the early days. Nowadays, to produce lambs of mutton type, some of one of the mutton breeds are used on the range Merino ewes. Ohio Merinos are famous, the strongest fine wool of the world being produced there. These Merino ewes are sometimes used for the production of very early lambs.

THE RAMBOUILLET.

This breed is the French Merino developed by the French Government early last century from Spanish stock. They were improved in form, constitution, size, and



Rambouillet ram.

breeding qualities. They have fewer folds in the skin. They have proved very popular on American ranges. Rambouillets are larger than Merinos.

JUDGING SHEEP.

How to tell the Age of Sheep.—The teeth are the best guide up to a certain age. The row of front or incisor teeth on the lower jaw (there are no incisors on the upper jaw) should be examined by holding the head firmly with one hand and separating the lips with two fingers of the other hand. Up to one year of age the lamb has eight small very white "sucking-teeth," called temporary incisors. About one year of age the centre pair is replaced by a pair of permanent incisors. These permanent teeth soon become much wider and larger than the sucking-teeth. The next pair of permanent teeth appear, one on each side of the first pair, about two years of age; the third pair soon after the sheep is three years old; and the fourth and last pair appears at the corners shortly after the sheep is four years old. Roughly, then, the sheep is as many years old as it has pairs of permanent incisor teeth.

With advancing age, the teeth become wider apart from growing out of the jaw. The aim should be to keep the breeding flock composed mainly of "full-mouth" ewes—that is, four or five years old—as this is the most profitable breeding period. Lambs should not be bred at all. Two-year-olds are not as reliable breeders as when older. Any time after five or six years of age teeth are liable to be lost or shed, which hinders feeding and is a great detriment to the ewe's usefulness. A good ewe can be kept in breeding condition after this by some extra care and feeding, and occasionally there are ewes which breed good lambs up to ten years of age.

JUDGING MUTTON SHEEP.

After looking at the teeth to determine the age, look the head over. A robust head, broad between the eyes, is an indication of a good sheep behind it. Then feel the shape, width, and depth of the neck, shoulders, and along the back to the tail-head, using one hand on each side the body. By careful handling the fleshing on the ribs and over the backbone can be estimated, also the width across the loin, and lower down the fullness of the leg of mutton. Handling is more necessary in judging sheep than with other kinds of live stock owing to the covering of wool.

In the ewe it is important to possess good milking qualities if she is to rear twins and get them early to maturity. Such a ewe is rather slender in the neck, with a long, feminine face and a body something like that of a dairy cow, wedge-shaped, deep in the chest, well-sprung ribs, deep-bodied, and wide across the hips and loin.

Quality is indicated mainly by cleanness of bone in the legs. Quality is important from a butcher's standpoint, as there is more saleable meat from a carcass of good quality, but even these will not dress much over half of their live weight.

The best wool on the sheep's back is around the shoulder, and the poorest on the thighs. To open and examine the wool, use the hands laid flat on these parts.

THE WOOL.

Wool-fibre is covered with minute scales resembling to some extent those on fish. These give the fibre its strength and its distinctive lustre. When a scale is injured or destroyed through disease, starvation, or mechanically, a weak point exists in the wool-fibre at that point, rendering it unfit to stand the strain of the combing process in worsted-manufacture. The interlocking of the scales of one fibre into those of another makes felting or close matting possible, which is necessary to the production of cloth. Merino wool, which is the finest, or least thick, often has but a single scale going right around the fibre. The medium-fine wools, such as the Shropshire and Hampshire, which have a thicker fibre, possess two, three, or more scales, and the long-wools, such as the Cotswold, Lincoln, and Leicester, several more scales, having the thickest fibre of all. The number of fibres growing on a square inch of skin is between 4,000 and 6,000. By crimp is meant the waviness of the fibre. A closely crimped fleece is a compact fleece and one which will hold the oil or yolk in the wool. This grease is a natural protection from rain and snow. Fine wools have a greater crimp than coarse.

STARTING A FARM FLOCK.

The beginner will perhaps do better by starting with good grades than with pure-breds until he gains experience. He should by all means use a registered ram, however. If he can obtain grades of the same breed and about the same type, his work in breeding and improvement will be all the easier. Uniformity of type in the flock is very desirable. The use of only the best rams from prolific stock and true to type is important when we consider that in five years' time after starting a man's flock all the breeding ewes will most likely have been bred by himself. The breeder, then, has the improvement of his flock in his own hands. In addition to using the best rams he must keep only the best ewes for breeders and sell the others. Ewes

which bring twins and raise strong, healthy lambs will likely transmit their breeding qualities to their progeny. A new ram lamb should be tested for breeding qualities on some of the old ewes whose capabilities are already known. This testing-out of a new sire is quite important if progress is to be made.

Inbreeding and Line-breeding.—The early improvers of the mutton breeds had to practice inbreeding, as they had only their own flocks to select from at first. Inbreeding is the mating of very close relations, as of sire and daughter. Line-breeding is the mating of relatives not so closely akin, although coming from the same ancestry. The advantage of this kind of breeding is that the good qualities of



An undesirable sire with narrow chest and poor conformation.

the family are strongly perpetuated. The blood is concentrated, and other characteristics are not introduced because outside blood is not used. The disadvantage is that any defect in the individuals, such as weakness of constitution or poor breeding qualities, if such is present, will be sure to crop out strongly. The defects, as well as the good qualities, are brought out strongly by inbreeding. There can be no gain in concentrating the blood of any but animals of the highest excellence. "Breed the best to the best" is always a safe maxim. Cross-breeding should not be practised unless in special cases, such as when mutton rams are crossed with Merinos.

CARE OF THE FLOCK IN THE FALL.

Starting with the breeding season, the management of a flock in autumn involves three important things—the selection and culling-out of the ewes; selection of the ram; and mating at the proper time.

Aged ewes should only be kept if they are known to be good breeders and as long as they are not past profitable age, say six years as a general rule. These undesirables, as well as those with spoiled udders, should have been disposed of in spring. In a small flock the ewes will all be known individually to an interested owner. A large flock should have book records kept by means of ear-marks. It must be remembered at this time that the best mothers are the best milkers. These ewes are liable to be low in flesh after weaning, say, twin lambs, and will show up poorly against a fat ewe which has had one lamb and raised it on little milk. The thin ewes are not usually the culis. Ewe lambs are not bred in their first year under

expert management. It stunts them, and they have few, small lambs. When they become yearlings in their second fall they should be mated with an aged ram of known breeding abilities, so that with their first crop of lambs the good breeders can be picked out.

Time of Mating.—Unless winter lambs are wanted the time of mating in British Columbia will be in September, October, or November, depending largely on the climate. The percentage of loss is liable to be high in our severer climates if the lambs come too early in the year. The ewe usually carries the lamb twenty-one weeks, so that mating early in September will bring the first lambs about the beginning of February. This may be done in our mild Coast climate. Mating in November will bring lambs in April, which is about right for a severe winter climate. It is a good plan to have the grass starting to grow so that the ewes can be turned out to pasture two or three weeks after the lambs arrive. The fall is the only time that ewes generally come in heat and will take the ram. The exceptions to this are Dorset, Merino, and Tunis ewes. The intervals between the periods of heat are from two to three weeks.

Flushing Ewes.—By this is meant extra feeding before mating to have the ewes gaining in flesh at the time. The advantages gained by the practice are stronger lambs and more of them. Besides this, the ewes mate more readily, and the lambs therefore come nearly at one time. The explanation is that the ovaries of the ewes are more active when the ewe is in good condition, not too fat. After weaning, the ewes are turned on short pasture until the milk-flow has stopped. Then they are given good pasture, such as good aftermath, rape pasture, or a ration of grain, to get them gaining in flesh. This is called "flushing" them.

The Ram in the Mating Season.—The ram should be well cared for at this time, and usually he is fed a grain ration every day by himself to avoid his getting run down in condition. Care must also be taken that he is not overworked. On the other hand, an overfat condition will give very poor results in either ram or ewe.

Number of Ewes to a Ram.—A yearling or older should serve fifty ewes in the season if taken out and fed grain once a day. Ram lambs answer well if used moderately. Twenty to twenty-five ewes is enough for a well-grown ram lamb. By turning the ram in with the ewes only morning and evening, his energies are conserved and more females can be taken care of by him. A mature ram so cared for and liberally fed can serve 100 in the season.

Marking Ewes as bred.—Usually the ram has his breast smeared with some colour of ochre and linseed-oil, so that all ewes bred by him are marked. The colour can be changed every ten days or so. The dates of breeding can thus be noted down, and if ewes come in heat again they can be picked out. Those that do not mate at all are also known. The ewes when bred are caught and the number of the ear-tags taken.

WINTER MANAGEMENT.

Housing and Feeding.—A warm barn is only necessary when lambing-time comes in severe weather. Close housing of sheep is wrong, and extremely bad results follow it. The sheep is an outdoor animal and cannot stand confinement. Close housing invariably leads to colds and other troubles. The fleece provides nearly all the protection necessary, provided the winter quarters are dry. Partially open sheds with dry footing are the best shelter; 12 to 15 square feet of floor-space and 18 inches of rack-space is required for each sheep. When the weather is dry the sheep will generally prefer to live and sleep outside. It will be most convenient to have the feeding-racks inside, but some of the roughage should be obtained outdoors almost all the time. This provides the breeding flock with much-needed exercise, without which trouble will follow at lambing-time. As long as the fields are fairly dry and there is grass there, the sheep will do better on the sod. Extra feed can be given at night at home. When there is no pasture or the ground is snowed under, the roughage can be fed in the fields in racks or scattered over the ground from a wagon.

Anyway, the breeding ewes must not be closely confined for long and they must have exercise. It is very desirable to keep the ewe lambs in a separate lot so that they get all the feed coming to them. The stud rams may be left with the main flock, but ram lambs kept over should be kept separate. All the breeding ewes should be watched, and their condition noted from time to time by feeling the covering of flesh over the backbone and loins. Sharp vertebrae sticking up indicate that more feed and care is necessary. If the points of the bones are not apparent there is danger of the ewes being too fat.

Winter Feeds.—Good clover or alfalfa hay is far better than timothy. Mixed hay is good, provided it is not too coarse. Sheep like fine herbage. Pea-straw, threshed or unthreshed, is good fodder for sheep. Oat-straw is the best of the grain straws, but is not equal to good hay. Unthreshed oat-sheaves are good, fed along with hay. Roots such as turnips or mangels are safer than silage, and are almost necessary to provide succulence in the ration. Silage can be safely fed if sound and free from mould or gassiness. Oats and bran, with perhaps a little linseed-meal, is about the best grain ration; 2 to 3 lb. of good hay, 2 to 4 lb. of roots, and $\frac{1}{4}$ lb. of grain is a winter ration for in-lamb ewes. If no grain is fed more roots and hay must be given. They also require lots of fresh, pure water. It should be accessible at all times. Coarse salt, made yellow with powdered sulphur, must also be given. It should be before them all the time. Rams are fed similarly. It should be said that a liberal supply of mangels sometimes causes stones or calculi in the bladder in rams.

SPRING MANAGEMENT.

Keep Ewes quiet.—Towards lambing-time care must be taken that ewes are not overcrowded at the racks, in gateways, etc., or made to jump over obstacles, frightened by dogs, or roughly handled. The duration of pregnancy is about 147 days, and during the latter part of this period there is danger of the ewes casting their lambs if any of the above things happen.

Signs of Lambing.—A few days before dropping the offspring the flanks will drop and the vulva appear red and swollen. Just before the actual birth the ewe appears restless and frequently changes her position.

Trimming Udders.—Previous to lambing, the wool should be clipped off on and around the udder, that might be in the way of the lamb sucking. This is so that the lamb will have less difficulty finding the teats, and there will be no danger of him getting hold of the wool-locks and swallowing them. Big, greedy lambs often die from wool-ball in the stomach, which might have been prevented. If very dirty the udders need to be washed, or the lamb may refuse to suckle.

Assistance in Lambing.—This is not very often necessary. The ewe should be left to herself until at least two hours after showing signs of lambing. Straining indicates that the lamb is about to be expelled. The "water-bag" soon bursts, and the forefeet of the lamb should then appear with the nose next, between the front legs. This is a normal birth presentation. If the lamb is seen or felt to be in any other position, with perhaps a leg or the head bent backwards, assistance must be given. With the hand and arm well washed and covered with vaseline, olive-oil, or lard, push back the lamb into the body until room can be obtained to turn it into the proper position. A cord can first be attached to one or both legs or to the lower jaw of the lamb if necessary. These operations must be done gently and carefully. Cases of inflammation of the womb caused by abnormal conditions at lambing should be treated by injection of a weak creolin solution into the womb through an oiled hose with funnel. Give by the mouth 2 drams of laudanum in 2 tablespoonfuls of raw linseed-oil. The after-birth, if retained in the ewe, should be gently and gradually pulled away. When expelled it must be removed and buried.

In cases of twins or triplets, there may be some time between births. When born, the second or third lambs should be put with the first, so that the ewe will at once know and own it.

Weak Lambs.—If the lamb has any difficulty in sucking, due to weakness or the restlessness or stupidity of the mother, assistance must be given by holding the ewe or tying her and directing the lamb. The milk should be started from the teat, and a little squirted into the lamb's mouth. As soon as the lamb is born the mucus should be cleaned from its nostrils and mouth, and the attendant may blow into the nostrils to start the lungs. The ewe will lick and dry her offspring, and in a few minutes a strong lamb should be on his feet. Weak, lifeless lambs can often be brought round by wrapping in hot blankets and feeding the ewe's milk frequently, a little at a time with a spoon, with perhaps a little whisky added.

Usually after two or three days a lamb does not suffer from cold even if the weather is severe with snow on the ground. It pays to give them attention at birth, at the time they need it.

Making Ewes accept Lambs.—Sometimes a ewe will have nothing to do with her own lamb. In that case her udder should be examined to see if there is an inflamed condition, and whether or not she has milk. She must be fastened up and held for the lamb to suck, so that she cannot butt the lamb. If the lamb is weak it may be transferred to another ewe and a strong and persistent lamb substituted. Patience is required to see that the lamb suckles frequently, at least every hour for a day or two, after which the ewe will own the lamb. It is often advisable to transfer lambs



Flock in which there are evidences of neglect.

to other ewes, as when a ewe loses her lamb or has too many to rear properly. In case two ewes lamb nearly together, the strange lamb should be rubbed with the other ewe's lamb or with her milk, or the dead lamb's skin may be sewed over the back of the living lamb. The ewe detects her lamb mainly by smell.

Orphan or Pet Lambs.—These may be reared by hand on pure cow's milk. A newly dropped lamb only requires 2 teaspoonfuls every hour the first day or two. The milk should be fresh and at blood-heat. An ordinary baby-bottle with rubber nipple can be used. A spoonful of lime-water can be added if indigestion troubles.

Feeding Grain to Lambs.—It will be wise to feed lambs grain right from the start if it is desired to get best results. After the lambs are born, if good pasture is not available, it will pay to feed grain to the ewes also, but not if they are on

good pasture. When one month old a lamb can do with about $\frac{1}{4}$ lb. of grain daily. A mixture of equal parts bran, oats, and linseed-oil meal is excellent.

Castration.—The best time to castrate ram lambs is between one and two weeks of age. The operator should have an assistant to hold the lamb. The assistant should hold the lamb belly up by gathering the four legs together and pressing the lamb against his body. The end of the scrotum or purse is pulled out free from the testicles and is cut clean off. The testicles will then protrude. The constriction near the end of each testicle is then slit, and the testicle springs out of its covering. The testicles are then grasped and pulled away, severing the cord as near to the body as possible. This method leaves the scrotum open so that any pus that forms has a chance to drain away.

Another method is to merely make two slits at the end of the scrotum, at the same time pressing each testicle outwards. Then severing as described. The disadvantages of this method is that the slits heal rapidly and do not allow drainage from the inner wound for long, so that inflammation may easily follow. If this occurs the scrotum should be cut open and washed with creolin, 1 part, and water, 50 parts. Carbolyzed vaseline may be used as a dressing.

Docking Lambs.—An expert will dock the tail with the lamb held standing between his legs. It is often more convenient to have the lamb held as for castration. All lambs should be docked. The long tail is a survival of ancient days when the sheep's tail was used as a storehouse against times of famine. In times of plenty it accumulated fat. In our modern breeds the long tail is useless, and, moreover, is a distinct danger, in that if the animal scours the long tail is sure to become filthy and a breeding-ground for flies and maggots. The best age for docking is as near the castration period as possible. In fact, many perform the two operations in the case of ram lambs at once, but this is rather severe. Ewe lambs should be docked when a week or ten days old. The tail is cut off with a sharp knife about an inch from the body. Where the skin of the body merges underneath into the tail at this distance, a joint will be located. When old sheep or lambs over five months have to be docked, a string should be first tied tightly above the cut to stop bleeding, and removed after a couple of days.

CARE DURING SUMMER.

Salting and Tarring.—The stud rams should be kept separate from the ewes, or there is a possibility of some being bred during summer. A mixture of coarse salt made slightly yellow with powdered sulphur should always be before the flock. A good, clean water-supply is essential. If running water is not available, the flock must be watered at least once a day. Horses should not be pastured in the same field if it is possible to avoid it. When rushing about, as they do at times, the sheep or lambs may be hurt. To ward off the attacks of the gadfly, which deposits a living grub in the nostril, it is best to coat the muzzles of all the sheep with tar early in the month of July. The tar can be warmed slightly and dabbed on with a small brush. Otherwise the grubs lodge in the head and cause irritation and a discharge from the nose in winter. Some kind of shade should be accessible in summer. Trees provide the best shade, but failing them an old shed or board shelter will do. Sheep will suffer if forced to bear the rays of the midday sun.

Changing Pastures.—Sheep are benefited more by changing their grazing-ground than any other stock. It is their nature to roam over a wide area seeking fresh pasture, and they are thus able to keep free of parasitic worms, etc. If a large pasture is divided up it will grow more feed and go further, and the change to fresh ground two or three times during the season will benefit the flock greatly.

Summer-grazing Crops.—If pasture is scarce, as it usually is at some time during the season, other grazing crops can be provided. Fall rye will provide fall and spring feed, then oats and peas, or equal parts of oats, wheat, and barley. Rape is a fine grazing crop, and will ordinarily be ready two months after it comes up. It can be sown broadcast, but is better drilled in rows 30 inches apart on the flat at

the rate of 2 lb. per acre. A good stand of rape will carry twenty lambs an acre for two months, and will put a fine finish on them, with a little grain to help. For ewes with lambs on rape an acre a month for twenty-five head combined may be reckoned sufficient. Sheep must not be turned on rape with stomachs empty. Rape and kale are sometimes sown with small grains, such as wheat and oats, or in the cornfield after the last cultivation, to be used as pasture in the fall. Alfalfa, like pure clover, is liable to cause bloat if pastured. It is best to cut it and feed it. Cabbage is also a good crop for sheep.

Weaning.—Four months of age is the usual time to wean lambs. Before weaning they should be eating grain well, so that there will be no set-back. At weaning-time the ewes should be put on short pasture to become dry. They can be put to glean the stubble-fields, etc. Hand-milking of some ewes is sometimes necessary to prevent spoiled udders, but usually the milk is reabsorbed without trouble.

FEEDING THIN SHEEP FOR MARKET.

For several years farmers in the Ladner District have made a practice of importing thin American sheep to run on the aftermath of the meadows. These sheep are marketed in fairly good condition from Christmas-time on. Little or no grain is fed, but good hay is provided if necessary. In the United States alfalfa-hay is much used for fattening thin range lambs.



Sheep badly infested with ticks.

SHEARING.

The proper time to shear must be left to the discretion of the owner. If the weather conditions are good it is best to shear when the wool begins to loosen up or "rise"; probably in April on the farm and later on the range. Shearing should be over by the time the hot weather commences. Shearing seems to act as a stimulus to the sheep, and they will immediately start to gain if well cared for.

Washing.—Sheep should not be washed before shearing unless they are very dirty and the wool chaffy. It is impossible for the farmer to do the job thoroughly, and there is danger of the animal catching cold. If shearing is done soon after washing, the weight of the wool shorn is much less, due to the washing-out of the oil in the wool.

Removal of the Fleece.—A good job can be done with the hand-shears, but a novice is sure to cut a lot of wool twice, and is also liable to injure the sheep. The

hand-power machine will be found useful on the farm. It can be obtained with different attachments for clipping sheep, horses, and cows. To shear, the sheep is thrown and placed on its haunches with its back against the shearer's legs. Commencing at the throat, an opening is made down the belly; then the legs are clipped, and the head and then one side clipped along until the backbone is reached. This latter is done with the sheep lying on the other side. By holding a front leg and keeping the head down the sheep is easily controlled. Then the animal is turned over to clip along the other side. When finished the sheep is lying on the untorn fleece.

The following concise directions on preparing wool for market are given in Pamphlet No. 2 of the Sheep Division, Live Stock Branch, Ottawa:—

"Directions for caring for Sheep in order to produce a Good Quality and Condition of Wool.—(1.) Feed sheep well and regularly. Sheep poorly fed will possess a harsh fleece lacking in oil and frequently with a feeble or weak fibre. This does not constitute desirable wool for sale. Where sheep are starved for a period, the effects will be shown in the wool by a weak section which will break readily and, consequently, cannot be used satisfactorily for combing or worsted purposes.

"(2.) Every effort should be taken to keep the wool free from chaff, hay, and burrs. This can be avoided by using proper feed-racks and care in preventing hay or straw dropping upon the sheep during feeding.

"(3.) If sheep are scouring, if possible keep the wool well clipped behind, so as to prevent the formation of heavy dung-locks.

"(4.) Endeavour to eliminate in breeding operations black sheep from the flock. Mate only sheep possessing pure white wool. Black wool is sold in the reject class.

"(5.) In marking sheep, never use oil paint or tar, which are insoluble and will not scour from the wool.

"(6.) Sheep should be dipped in some reliable material twice a year, in the fall before entering winter quarters and in the spring after shearing.

"Directions for preparing and packing Wool.—(1.) Shearing should be done on a clean board floor, never on the dirt, and the fleece should be kept as compact as possible.

"(2.) Fleeces should be tied with paper twine, never binder or sisal twine. Turn in the sides of the fleece and roll compactly from tail to neck with the bright or clipped surface outward.

"(3.) The wool should be packed in very closely woven jute, hemp, or paper-lined sacks.

"(4.) Tags, dung-locks, or stained pieces should never be included with the fleeces, but always packed separately if wool is adhering to them.

"(5.) All black or grey fleeces should be packed by themselves.

"(6.) Lamb fleeces, possessing unusual quality and length, may well be kept apart from the others and offered for sale as a distinct class.

"(7.) The wool should be absolutely dry at shearing and should never, subsequently, be permitted to become wet.

"(8.) Tub-washing should not be practised. If washing is followed at all, let it be done on the sheep's back, and at the time of shearing keep the washed separate from the unwashed."

DIPPING FOR TICKS.

Sheep should be dipped at least once every year, and twice if necessary. Soon after shearing is the usual time to give the main dipping, but fall dipping is usually needed. After shearing, most of the ticks are on the lambs and will hinder their growth. The earlier it can be done, with the weather fairly warm, the better. The wool will be short, and so the dip will be effective. If lambs are less than three weeks old, however, there is danger of the ewes disowning their lambs on account of the dip destroying the scent by which the lamb is recognized.

If any ticks are present the flock should be dipped in the fall, so that the sheep are not worried all winter by the vermin. It is difficult to see why sheep-owners

neglect fall dipping, but it is probably because the wool is long and the ticks are not noticed in the fall. In case winter has set in before the dipping is done, it is best to use a paste dip which can be rubbed on. An illustration is given of a type of dipping-tank for a small flock. For a flock of several hundred the tank would have to be twice as long, so that the sheep can swim through and dip themselves. The width is about 2 feet at the top, narrowing to 1 foot at bottom. Two-inch plank makes a good tank, but, of course, concrete is more durable. Buy only one of the well-known brands of sheep-dip and use according to the directions given on the container. They usually contain carbolic, arsenic, or tobacco poison. When using small tanks or barrels, care must be taken that the liquid reaches all parts of the body.



Dipping a large flock.

CATCHING AND THROWING SHEEP.

The best way to catch sheep is to have them bunched close together in a small pen or corral. These should be built in a corner of the pasture, so that if a sheep is seen to be lame or ill or fly-blown it can be examined at once. When sheep are bunched close together the person may be right among them and they cannot rush about and hurt themselves. Sheep should not be clutched violently by any part of the wool that can be reached. Catching them in this manner injures the skin and hurts the sheep.

The proper place to catch hold of a sheep is just above the left hock. Use the right hand, and then with the left grasp the wool of the lower jaw. The sheep can be led forward by moving the right hand up to the tail.

To throw a sheep it should be held under the jaw with one hand while the other grasps one of hind legs and pulls it forward. At the same time the sheep is pushed backward on to its haunches, and then held with the front end raised and its back against the person's legs.

To lift a sheep bodily, the best way is to have another person to grasp both hands under the sheep's belly.



Catching, throwing, and leading a sheep.

TRIMMING THE FEET.

This should be done once or twice a year at least, if the flock is not on rocky ground. The outside of the hoof grows long, then curls over, causing dirt to lodge, and then lameness soon follows. The overgrown horn must be trimmed down with a sharp knife level with the sole. This operation will also shorten the toe and bring the foot to its proper shape. Care must be taken not to shave off too much, or you will cut into the quick and cause bleeding. If this is done the foot should be dressed with pine-tar before the sheep is allowed to go.

HOME-RAISED MUTTON.

To avoid a "woolly" flavour in mutton, certain things have to be attended to, namely:—

- (1.) Fast the sheep at least twenty-four hours before killing, or it will not bleed well.
- (2.) Have it penned up so that it need not be chased and excited.
- (3.) Provide water while fasting.
- (4.) Dress immediately after killing.

An old sheep may be stunned before sticking, or a lamb's neck broken just after sticking, by a short twist upwards. The knife is passed through the neck just behind the jaw, with the sharp edge toward the backbone. The flesh is cut to the bone. The windpipe should not be cut if the sheep is properly stuck.

Mutton must not be cooked before the animal heat is all out, or it will be disgusting.

In a cold climate it can be kept in summer in a cold-store room attached to the ice-house, or in winter it can be packed in snow. It should not be allowed to thaw and freeze again, as it takes the mellow and flavoury taste away.

Corned Mutton.—The following are two recipes for corning mutton:—

(1.) Make a brine strong enough to carry a potato about half out. To half a barrel of this brine add $\frac{1}{2}$ lb. of saltpetre. In ten to twelve days the meat will be cured, and may be kept in a weaker brine.

(2.) To every 4 gallons of water allow 2 lb. brown sugar and 6 lb. salt; boil 20 minutes and skim. Add 4 oz. saltpetre. When quite cool pour on the meat, which has been sprinkled with salt and packed in a tub. In two months it will be necessary to pour off the brine, boil, and skim again, adding 3 oz. brown sugar and $\frac{1}{2}$ lb. salt.



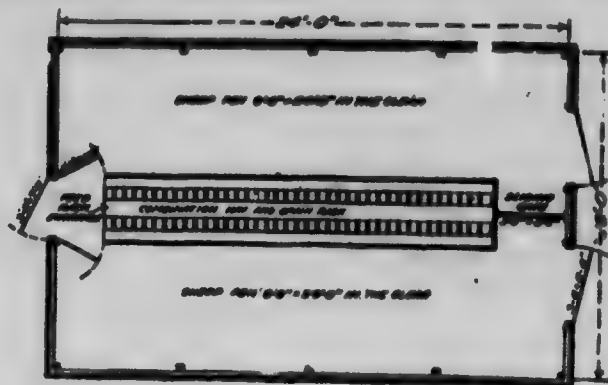
Trimming the feet.

Spiced Mutton Hams.—Sprinkle and rub into the ham a teaspoonful of saltpetre. Then rub on 2 teaspoonfuls ground allspice and cloves, equal parts; then rub on about a teacup of brown sugar. Then rub in salt for about a minute, and repeat the above every other day for three weeks. Do not oversalt, as mutton takes salt quite readily. Mutton thus cured is delicious boiled, or sliced and fried.

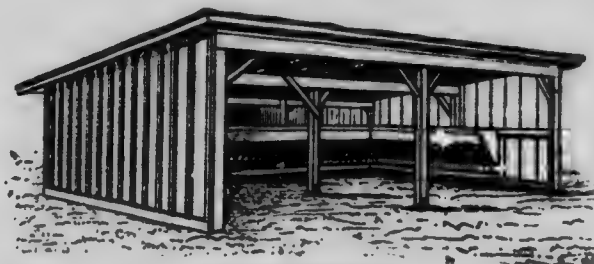
RANGE MANAGEMENT.

Many of the elevated ranges of the Interior have been overgrazed and are deteriorating. Such areas should be given a rest by being fenced, so that the grasses may have a chance to reseed themselves. On a range at an altitude of 5,000 feet in Washington artificial seeding was tried. The following grasses gave good results

when the seed was sown in the fall and harrowed in: Timothy, tall fescue, orchard-grass, and brome-grass. On all ranges enough grass should be left to mature every year to ensure that the grasses will be perpetuated by reseeded, and sheep should not be turned on the range until the grass is well started in the spring, otherwise they are tempted to eat poisonous weeds.



Floor plan of closed sheep-shed.



An open sheep-shed.



The work of sheep-killing dogs.

On the range it will pay to provide lambing-sheds and individual pens for the flock at lambing-time. A loss of about 15 per cent. of the lambs can be prevented by giving the necessary attention at this time. An experienced herder with a boy and horses can take care of 1,000 head on the range in open country. Good herders lose very few sheep or lambs by coyotes. Good dogs are a great help. A range

flock of over 1,000 head in the Okanagan, after paying the wages of the herder, and a boy who was employed as help in the summer, team-work, cost of shearing, etc., and deducting cost of feed, last year returned a clear profit of \$4 per ewe.

THE DOG NUISANCE.

Dogs, besides worrying sheep, may scatter parasites, such as the eggs of tapeworms, over the pastures, to infect the sheep. It has been estimated that the losses caused by sheep-worrying dogs are equal to those caused by disease. The "Sheep Protection Act, 1917," affords some relief. It provides for the formation of sheep-protection districts within which all dogs must be licensed. Any dog not bearing a licence-tag, or any dog seen at any time in the act of chasing sheep, or any dog at large between sunset and sunrise, may be killed by any person, under the provisions of this Act. A loaded shotgun or rifle should be kept handy always.

It is not only the sheep which are actually hurt or killed which are damaged, but the whole flock. Ewes which have once been chased will abort, lose flesh, and prove unprofitable breeders.

Sheep are nearly always killed by dogs during the night-time, so that it is desirable to get the flock into the habit of sleeping near home by providing salt near the buildings. It is also a good plan to put lots of sheep-bells and several larger bells on the flock. This will act as a deterrent to marauding dogs or coyotes, as well as warning any one within hearing if trouble is afoot. A dog-proof fence is one of woven wire about 5 feet 6 inches high, with a strand of barbed wire along the bottom and top. Very few pasture fences are dog-proof. If confined in a dog-proof enclosure at night, the flock should be fed or else set at liberty very early in the morning.

TRAPPING AND POISONING COYOTES.

A No. 3 trap is the size to use in trapping coyotes. It should be fitted with swivels and fastened to a log or stone weighing at least 30 lb. The trap is covered lightly with earth and baited, several traps being set together. Poisoning is the means generally used to exterminate these pests. Strychnine in 2-grain gelatine capsules is the best poison. These capsules are first dipped in melted tallow and then placed inside pieces of tallow or suet about the size of a walnut, afterwards closing the cavity. Eggs or pieces of liver the size of an egg may be used for bait also. Gloves should be worn. The bait is best covered with blood.

COYOTE-PROOF FENCES.

These are used to some extent in the Western States. This method of handling sheep has much to commend it, but the cost of fencing is excessive, unless the range has very good carrying capacity. The following are specifications for a coyote-proof fence:—

Posts at intervals varying from 8 to 30 feet; light stays used every 10 feet where posts are far apart. On the surface of the ground a barbed wire, preferably a 4-point barb hog-wire; 3 inches higher a 34-inch Elwood lawn-fence with 4-inch triangular mesh; 5 inches above the woven wire a plain barbed wire; 6 inches higher a second barbed wire; and 8 inches above this a third barbed wire.

Great care should be taken in making the bottom of the fence tight. If properly done there will be no trouble from coyotes, and practically no repair-work will be needed until the bottom wire rusts out. If half-done there will be continual annoyance. The fence should be well braced. Such a fence will be likely to cost at least \$500 per mile, including construction.

The advantages of fencing the range may be summarized as follows: (1) Increased carrying capacity of 50 per cent. over the customary herding system; (2) heavier sheep; (3) decrease from 3 per cent. to $\frac{1}{2}$ of 1 per cent. in the loss at least; (4) less expense for handling; (5) increase in the lamb-crop; (6) heavier and cleaner wool-crop.

DISEASES OF SHEEP.

The sheep more than any other domestic animal suffers from internal parasites. If these can be avoided there will be little disease in a flock. Two parasites invade the lungs, two the stomach, six the intestines, one the liver, and two affect the brain.

Gid, Turnsick, or Sturdy.—This disease is caused by a form of young tapeworm which in its adult stage is found in the dog or wolf species. The sheep affected are seen to have a nervous twitching of the herd, an unnatural elevation and tossing of the head to one side, running or crushing against fences or obstacles, or moving in a circle. In advanced cases the sheep falls over with head thrown back and struggles until it dies.



Coyote-proof fence erected by the United States Forest Service. Hunter and hound patrolling.

No treatment is successful. It is best to kill the sheep in the early stages of the disease when the carcass is fit for human food. The cyst of the tapeworm lodges near the brain and the pressure thereon causes the death of the sheep. When this cyst is swallowed by a dog or coyote (supposing the brain is thrown away), the tapeworm grows to maturity in the animal, and it gives off eggs which may be eaten by sheep when grazing and cause this disease.

Sheep-dogs should be cured of tapeworm by fasting twelve hours and then dosing with 1 dram of extract of male shield fern in a small amount of milk, followed in two hours by 1 oz. of castor-oil. No solid food should be given until the tapeworm is expelled. Segments of the tapeworm in the dung are a sign of infection.

Tapeworms, Round-worms, and Stomach-worms.—Sheep have tapeworms which inhabit the intestines. Sheep with tapeworm have an abnormal appetite, accompanied by general weakness and debility, loss of flesh, and paleness of skin and mucous membranes. Round-worms in the intestines cause similar symptoms, one species causing nodules on the walls of the intestine, known as nodular disease or "knotty-gut." Lambs pick up the eggs and are affected by grazing after their mothers, in which case frequent change of pasture is a preventive. Blue vitriol or copper sulphate dissolved in water is a good remedy for worms. Stomach-worms cause more deaths than the other species. The twisted stomach-worm invades the fourth stomach, and resembles a barber's pole somewhat. The symptoms and treatment are the same.

Bluestone Solution for Worms.—Dissolve 2 oz. of bluestone in a gallon of boiling water, then add another gallon of water. The doses are as follows: Lambs, three months, 1 oz. of solution; lambs, six months, $1\frac{1}{2}$ oz. of solution; sheep, one year, $2\frac{1}{2}$ oz. of solution; sheep, one and one-half years, 3 oz. of solution; sheep, two years, $3\frac{1}{2}$ oz. of solution.

Lung-worms, Hoarse, or Husk.—This disease is caused by small worms in the air-passages or lungs. The sheep has a low, husky cough. Calves and pigs have the same disease. Lambs get infected by grazing on infected pastures, especially on low land. One to four teaspoonfuls of turpentine, or the breathing of the fumes of burning sulphur as thick as a person can stand, are the remedies.

Grub in the Head.—In midsummer the sheep gaily harasses the flock, and if possible deposits its living grubs inside the sheep's nostrils. These crawl up and attach themselves to the membrane of the passage leading to the nostrils, causing a discharge which may be mistaken for that caused by a cold. The sheep try to avoid the fly by seeking the shade and putting their noses to the ground. Their noses may be tarred as a preventive, and shade should be provided if not available, as the fly does not attack them under shelter. No other remedy can be given.

Scours.—When turned suddenly on rank pasture sheep are apt to get diarrhoea, or scours. Any sudden change of food is apt to cause this. A removal of the cause and a dose of a dessertspoonful of laudanum for a mature sheep (less for lambs) given in milk or water will cure this. It is to be followed by a teaspoonful of ground ginger in a cup of warm water. Scours may be caused by the presence of worms, in which case the above would not be effective.

Constipation.—Caused by long feeding on dry foods, such as straw and timothy hay. When the sheep "stretches" it is a symptom. The remedy is a physic of Epsom salts, 4 oz., or raw linseed-oil, 8 oz. Feed roots or bran with salt and ginger, and abundance of salt and drinking-water.

Lamb-cholera.—Sometimes the fattest and biggest lambs are suddenly attacked by this disease, the cause of which is unknown, and die in a spasm. The only remedy which is of any avail is bleeding. The tail may be cut off or a vein on the inside of the fore leg slit. A cupful of blood may be taken from a two-months-old lamb.

Colic and Bloating.—A dose of 8 oz. of raw linseed-oil or a tablespoonful of baking-soda in warm water will give relief. In bad cases it may be necessary to stick a knife or a trocar into the paunch to let the gas out. The point to puncture is on the left side, midway between the last rib and the point of the hip. The hip is the bone which sticks out at this point. The paunch is just underneath the skin.

Pink-eye.—This disease is infectious and causes sore eyes. The sheep should be isolated and the eyes washed with weak antiseptic, such as a 1-per-cent. creolin solution. If a film covers the eye, enough burnt alum to cover a dime should be blown through a tube into the eye held open.

Goitre or Swelled Neck.—No definite cause has been established for this disease, but it is thought to be caused by the absence of lime and perhaps other substances in the water and food of breeding stock. The remedy is to give pregnant ewes a mixture of slaked lime and salt made slightly yellow with powdered sulphur. This should be before them all the time, especially in winter when in lamb, but do not use much sulphur in the mixture. Want of exercise seems to make this disease worse.

Scab.—This disease is not present in Canada. It is very infectious, and is rigidly guarded against by the Dominion veterinary authorities. The scab parasite causes great irritation, and the wool comes off in patches. Any sign of this disease must be reported immediately to the nearest Dominion Inspector.

Maggots.—These are the grubs of the bluebottle or blowfly. Sheep which have sores or else silt about their hinder parts become flyblown. The maggots hatch from the egg in one day. They will soon eat into the body unless checked. If a sheep is noticed very restless, running short distances at a time or wagging its tail,

it must be caught and examined. Gasolene will kill the maggots, and then lime should be sprinkled over the part to prevent further attacks.

Apths or Sore Mouth.—When lambs are affected with sore mouths or lips the ewe's udder will likely be affected also. Use a mixture of boric acid, 1 part, and lard, 8 parts, on the udders. For the mouth use carbolic ointment frequently.

Wool Balls.—Wool balls in lambs' stomachs may cause many deaths. The lambs may get hold of the wool around the ewe's udder if not clipped away, or they may have digestive troubles which cause them to eat the wool, or they may eat wool when biting their sides because of the irritation from ticks. The feeding of salt, phosphate of lime, or bone-meal may be necessary. Doses of raw linseed-oil, 3 or 4 oz., may be given.

Foot-rot.—This is usually the result of non-attention to the feet, combined with muddy ground. A lame sheep should be caught and the hoof pared down with a sharp knife level with the sole. Then it should be dressed with a solution of copper sulphate, 1 oz. to 2½ pints of water. Then chloride of antimony should be applied, after which a coating of pine-tar should be put on. A large flock may be treated by running them through a trough in which is 10 lb. of copper sulphate dissolved in 5 gallons of water, or else the sheep can be herded a short time in a bed of freshly slaked lime 3 inches deep.

Tick Paralysis.—A species of wood-tick causes paralysis in humans and in sheep in districts, but the disease is not common. The ticks must be pulled off any affected sheep, when they will recover. The Similkameen Valley is most affected.

Roaring Disease.—This trouble in sheep has been found in Chopaka and Pen-ticton Districts. Ten per cent. of one large flock was affected, and some died. The sheep seem to become infected on timbered ranges only. The disease appears about June and disappears in August, most of the animals recovering. The only remedy yet found is the avoidance of heavily timbered ranges.

Plant Poisoning.—Among poisonous plants may be mentioned larkspur, aconite, death-camas, loco-weed, lupine, and the various poison-hemlocks. Give milk, whites of eggs, alcoholic stimulants, and a weak solution of permanganate of potash, if available.

NOTE.—One tablespoonful equals about ½ oz.; 1 dessertspoonful equals about 2 fluid drams; 1 teaspoonful equals about 1 fluid dram; 1 tablespoonful carbolic acid or other disinfectant in 3 pints water equals a 1-per-cent. solution.

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